

Claims:

1. (Currently Amended) In an anti-reflective composition for attenuating light during lithography processes, said composition comprising a plurality of components dissolved or dispersed in a solvent system, the improvement being that:

at least about 95% of said components in said anti-reflective composition are non-polymeric and have a molecular weight of less than 1,000 g per mole of component; and said composition comprises a first compound having at least two epoxy moieties reacted with respective light attenuating compounds.

2. (Previously Presented) The composition of claim 1, wherein at least about 98% of said components have a molecular weight of less than 1,000 g per mole of component.

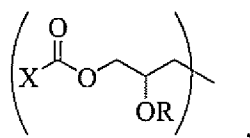
3-4. (Canceled)

5. (Previously Presented) The composition of claim 1, wherein said light attenuating compounds comprise respective carboxylic acid groups bonded with respective chromophores.

6. (Original) The composition of claim 5, wherein said chromophores comprise cyclic groups.

7. (Original) The composition of claim 6, wherein said chromophores comprise aromatic groups.

8. (Previously Presented) The composition of claim 1, wherein said first compound comprises at least two moieties having the formula

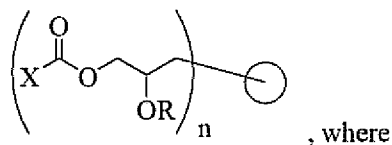


where:

each X is a chromophore; and

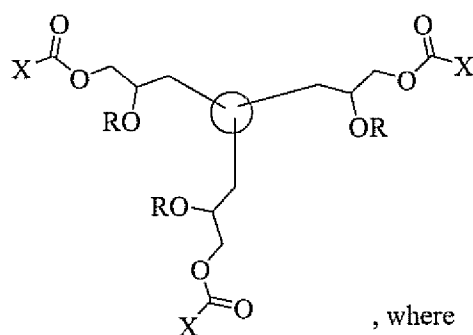
each R is selected from the group consisting of hydrogen and C₁-C₈ alkyl groups.

9. (Previously Presented) The composition of claim 8, wherein the first compound has the formula



is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing, and n is at least 2.

10. (Previously Presented) The composition of claim 8, wherein said first compound has the formula



is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing.

11. (Original) The composition of claim 8, wherein X is selected from the group consisting of benzene, anthracene, naphthalene, and alkyls.

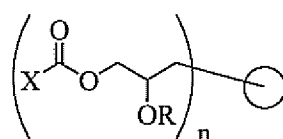
12. (Original) The composition of claim 1, wherein said composition further comprises an ingredient selected from the group consisting of surfactants, crosslinking agents, catalysts, and mixtures thereof.

13. (Original) The composition of claim 12, wherein said ingredient is a crosslinking agent selected from the group consisting of aminoplasts, epoxy resins, anhydrides, and mixtures thereof.

14. (Original) The composition of claim 12, wherein said ingredient is a catalyst selected from the group consisting of sulfonic acids, thermal acid generators, carboxylic acids, and mixtures thereof.

15. (Original) The composition of claim 1, wherein said solvent system includes a solvent selected from the group consisting of propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, ethyl lactate, propylene glycol n-propyl ether, cyclohexanone, tetrahydrofuran, dimethyl formamide, γ -butyrolactone, and mixtures thereof.

16. (Currently Amended) In an anti-reflective composition for attenuating light during lithography processes, said composition comprising a plurality of components dissolved or dispersed in a solvent system, the improvement being that said composition comprises a non-polymeric compound having at least two moieties having the formula



where:

each X is a chromophore;

each R is selected from the group consisting of hydrogen and C₁-C₈ alkyl groups; and



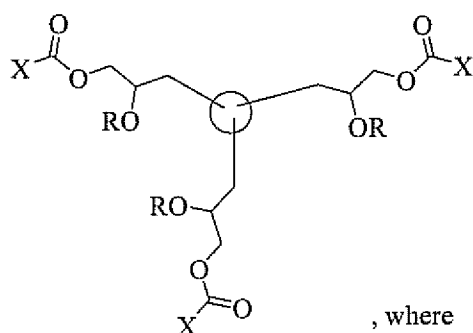
is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing, and n is at least 2.

17. (Original) The composition of claim 16, wherein at least about 98% of said components have a molecular weight of less than about 5,000 g per mole of component.

18. (Original) The composition of claim 16, wherein said compound has a molecular weight of less than about 5,000 g per mole.

19. (Canceled)

20. (Previously Presented) The composition of claim 16, wherein said compound has the formula



is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing.

21. (Original) The composition of claim 16, wherein X is selected from the group consisting of benzene, anthracene, naphthalene, and alkyls.

22. (Original) The composition of claim 16, wherein said composition further comprises an ingredient selected from the group consisting of crosslinking agents, catalysts, and mixtures thereof.

23. (Original) The composition of claim 16, wherein said solvent system includes a solvent selected from the group consisting of propylene glycol monomethyl ether, propylene glycol monomethyl ether acetate, ethyl lactate, propylene glycol n-propyl ether, cyclohexanone, tetrahydrofuran, dimethyl formamide, γ -butyrolactone, and mixtures thereof.

24. (Currently Amended) A method of using a composition in lithographic processes, said method comprising the step of applying a quantity of a composition to a substrate to form a layer thereon, wherein said substrate has a hole formed therein and defined by a bottom wall and sidewalls, and said applying step comprises applying said composition to at least a portion of said bottom wall and side walls, said composition comprising:

a solvent system; and

a plurality of components dissolved or dispersed in said solvent system, said components including a compound comprising at least two epoxy moieties reacted with respective light attenuating compounds, the improvement being that at least about 95% of the components in the composition are non-polymeric and have a molecular weight of less than 1,000 g per mole of component.

25. (Canceled)

26. (Original) The method of claim 24, further including the step of baking said layer at a temperature of from about 100-250°C to yield a cured or hardened layer.

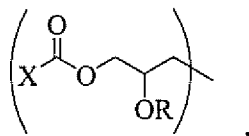
27. (Original) The method of claim 26, further including the step of applying a photoresist to said cured or hardened layer.

28. (Original) The method of claim 27, further including the steps of:
exposing at least a portion of said photoresist to light; and
developing said exposed photoresist.

29. (Original) The method of claim 24, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, SiGe, and tantalum nitride wafers.

30. (Canceled)

31. (Previously Presented) The method of claim 24, wherein said compound comprises at least two moieties having the formula



where:

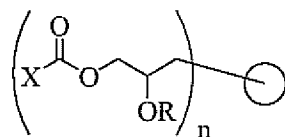
each X is a chromophore; and

each R is selected from the group consisting of hydrogen and C₁-C₈ alkyl groups.

32. (Currently Amended) A method of using a composition in lithographic processes, said method comprising the step of applying a quantity of a composition to a substrate to form a layer thereon, said composition comprising:

a solvent system; and

a non-polymeric compound dispersed or dissolved in said solvent system, said compound having at least two moieties having the formula



where:

each X is a chromophore;

each R is selected from the group consisting of hydrogen and C₁-C₈ alkyl groups; and



is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing, and n is at least 2.

33. (Original) The method of claim 32, wherein said substrate has a hole formed therein, said hole being defined by a bottom wall and sidewalls, and said applying step comprises applying said composition to at least a portion of said bottom wall and sidewalls.

34. (Original) The method of claim 32, further including the step of baking said layer at a temperature of from about 100-250°C to yield a cured or hardened layer.

35. (Original) The method of claim 34, further including the step of applying a photoresist to said cured or hardened layer.

36. (Original) The method of claim 35, furthering including the steps of:
exposing at least a portion of said photoresist to light; and
developing said exposed photoresist.

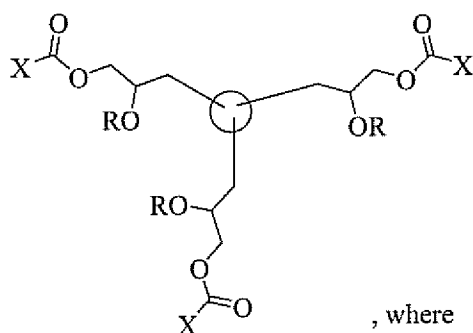
37. (Original) The method of claim 32, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, SiGe, and tantalum nitride wafers.

38. (Original) The method of claim 32, wherein said composition comprises a plurality of components dissolved or dispersed in said solvent system and at least about 98% of said components have a molecular weight of less than about 5,000 g per mole of component.

39. (Original) The method of claim 32, wherein said compound has a molecular weight of less than about 5,000 g per mole.

40. (Canceled)

41. (Previously Presented) The method of claim 32, wherein said compound has the formula



is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing.

42. (Original) The method of claim 32, wherein X is selected from the group consisting of benzene, anthracene, naphthalene, and alkyls.

43. (Original) The method of claim 32, wherein said composition further comprises an ingredient selected from the group consisting of crosslinking agents, catalysts, and mixtures thereof.

44. (Currently Amended) A precursor structure formed during photolithographic processes, said structure comprising:

a substrate having a surface;

an anti-reflective layer on said substrate surface, said layer being formed from a composition comprising:

a solvent system; and

a plurality of components dissolved or dispersed in said solvent system, said components including a compound comprising at least two epoxy moieties reacted with respective light attenuating compounds, the improvement being that at least about 95% of the components in the composition are non-polymeric and have a molecular weight of less than 1,000 g per mole of component,

wherein said layer absorbs at least about 95% of light at a wavelength of about 193 nm and at a layer thickness of about 320 Å.

45. (Original) The structure of claim 44, further including a photoresist adjacent said anti-reflective layer.

46. (Canceled)

47. (Original) The structure of claim 44, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, SiGe, and tantalum nitride wafers.

48. (Currently Amended) A precursor structure formed during photolithographic processes, said structure comprising:

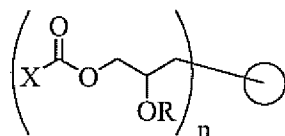
a substrate having a surface;

an anti-reflective layer on said substrate surface, said layer being formed from a composition comprising:

a solvent system; and

a non-polymeric compound dispersed or dissolved in said solvent system,

said compound having at least two moieties having the formula



where:

each X is a chromophore;

each R is selected from the group consisting of hydrogen and C₁-C₈ alkyl groups; and



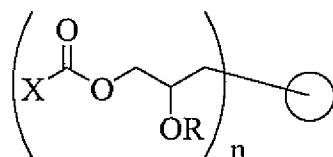
is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing, and n is at least 2.

49. (Original) The structure of claim 48, further including a photoresist adjacent said anti-reflective layer.

50. (Original) The structure of claim 48, wherein said layer absorbs at least about 95% of light at a wavelength of about 193 nm and at a layer thickness of about 320 Å.

51. (Original) The structure of claim 48, wherein said substrate is selected from the group consisting of silicon, aluminum, tungsten, tungsten silicide, gallium arsenide, germanium, tantalum, SiGe, and tantalum nitride wafers.

52. (Currently Amended) A non-polymeric compound having at least three moieties having the formula



where:

each X is a chromophore;

each R is selected from the group consisting of hydrogen and C₁-C₈ alkyl groups; and

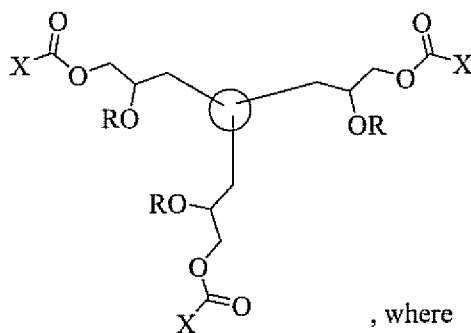


is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing, and n is at least 3.

53. (Original) The compound of claim 52, wherein said compound has a molecular weight of less than about 5,000 g per mole.

54. (Canceled)

55. (Previously Presented) The compound of claim 52, wherein said compound has the formula



is selected from the group consisting of cyclic, acyclic, aliphatic, and aromatic components, and functional moieties of the foregoing.

56. (Original) The compound of claim 52, wherein X is selected from the group consisting of benzene, anthracene, naphthalene, and alkyls.

57. (Canceled)